

How many type specimens can be stored in old lesser-known herbaria with turbulent histories? – A *Juncus* case study reveals their importance in taxonomy and biodiversity research

Jarosław Proćków¹, Anna Faltyn-Parzyńska¹, Paweł Jarzembowski¹,
Małgorzata Proćków², Anna Jakubska-Busse³

1 Department of Plant Biology, Institute of Biology, Faculty of Biology and Animal Science, Wrocław University of Environmental and Life Sciences, ul. Kozuchowska 5b, 51-631, Wrocław, Poland **2** Museum of Natural History, University of Wrocław, Sienkiewicza 21, 50-335 Wrocław, Poland **3** Department of Botany, Institute of Environmental Biology, Faculty of Biological Sciences, University of Wrocław, Kanonia 6/8, 50-328, Wrocław, Poland

Corresponding author: Jarosław Proćków (jaroslaw.prockow@upwr.edu.pl)

Academic editor: Sandy Knapp | Received 2 February 2020 | Accepted 20 May 2020 | Published 16 July 2020

Citation: Proćków J, Faltyn-Parzyńska A, Jarzembowski P, Proćków M, Jakubska-Busse A (2020) How many type specimens can be stored in old lesser-known herbaria with turbulent histories? – A *Juncus* case study reveals their importance in taxonomy and biodiversity research. *PhytoKeys* 153: 85–110. <https://doi.org/10.3897/phytokeys.153.50735>

Abstract

Many herbarium sets in Europe are still being catalogued and it is likely that many old-type collections are yet to be discovered. This research has the potential to facilitate the study of the biodiversity of many regions, especially regions for which collections are extremely scarce. This has been confirmed by a case study using *Juncus* (Juncaceae) examining the turbulent history of botanical collections at the WRSL herbarium and the evaluation of its importance to the study of taxonomy and biodiversity since 1821. The analysis revealed that the WRSL collection is rich in types (ca. 3.6%) and we identified 76 (of 78) new, historically and nomenclaturally important specimens (types, original material and so-called “topotypes”). Some of these type specimens represent duplicates of these that were stored in Berlin and destroyed during World War II. Many of the type specimens are from the United States of America, South Africa, India, and Canada. The largest number of *Juncus* type specimens stored at WRSL originate from South Africa (42.3% of all type specimens), even though *Juncus* is rare in Africa. Our study highlights that uncatalogued old collections that are under-explored and under-exploited have the potential to facilitate the discovery of specimens important for the study of biodiversity, conservation, taxonomy and nomenclature.

Keywords

biodiversity, conservation, historical collections, Juncaceae, *Juncus*, plant taxonomy

Introduction

The Natural History Museum of Wrocław University (Muzeum Przyrodnicze Uniwersytetu Wrocławskiego) is the oldest natural history museum in Poland and its history dates back to 1814, when it was founded by Prof. Johann Ludwig Christian Gravenhorst as the Zoological Museum. Currently, it houses both the botanical and zoological collections. The beginning of the herbarium in its present form was the Herbarium Horti Botanici Universitatis Wratislaviensis, which was established by Prof. Ludolph Christian Treviranus in 1821 (Wiktor 2002; Wanat 2013). The Herbarium Silesiacum was independently founded by the Silesian Association of Native Culture (Schlesische Gesellschaft für Vaterländische Cultur) and, until 1945, it was housed on Tamka Island, Wrocław. It developed independently from the other botanical collections, but following the Second World War, it was merged with the main part of the herbarium.

Many distinguished botanists have worked in the WRS� herbarium (Museum of Natural History, University of Wrocław, Poland, in Polish: Zielnik WRS�), including the directors or curators of Wrocław's botany collections, for example, Ludolf Christian Treviranus (1821–1830), Christian Gottfried Nees von Esenbeck (1830–1852), Heinrich Robert Goeppert (1852–1884), Heinrich Gustav Adolf Engler (1884–1889), Ferdinand Cohn (1884–1893) and Ferdinand Pax sen. (1893–1927). The Herbarium Silesiacum was curated by Julius Milde (1865–1870), Gustav Wilhelm Körber (1871–1885), Rudolf von Uechtritz (1886), Theodor Schube (1890–1929) and Emil Schalow (1930–1944) (Wiktor 2002).

Professor H.R. Goeppert expanded the botany collections and established the Botanical Museum (Botanisches Museum) in 1853 (Wanat 2013). The first known catalogue of the Museum (Goeppert 1884) included 26 different collections, including the Herbarium of the World, the Herbarium Silesiacum, the Herbarium Mycologicum, a wood collection and several fruit and seed sets. Goeppert also opened another museum in 1878 – The Museum of the Botanical Garden (Mularczyk 1998). In 1888, all these several botanical collections belonging to the University were moved to a building that is today located at 6/8 Kanonia Street. However, they still consisted of two separate collections (the Botanical Museum in charge of Prof. Cohn and collections of the Herbarium and the Museum of the Botanical Garden in charge of Prof. Engler). Due to the efforts of Prof. Engler, a private Silesian plant collection assembled by Rudolf von Uechtritz was purchased at this time and M. Winkler donated his herbarium to the Museum, which he had compiled for 30 years (Wiktor 2002).

At the end of nineteenth century, Ferdinand Pax (the elder) merged all the University botanical collections under the name of the Botanical Museum. His own collections were also included in the Museum at this time. Before merging, von Uechtritz's herbarium of Silesian plants was handed over to the Herbarium Silesiacum (then still independent) on his initiative. In exchange for Uechtritz's herbarium, the Botanical Museum later received the Herbarium Henschelianum (part of the Herbarium Silesiacum) with ca. 100,000 sheets.

As a result of these mergers and gifts, the Wrocław herbarium had acquired an extensive and significant collection of specimens from Europe (especially the Mediter-

anean) and the rest of the world. These were collected by botanists such as Hubert Winkler (a student of F. Pax the elder) in East Africa, Cameroon, Java, Sumatra and Borneo. In 1938, a collection of ca. 50,000 herbarium sheets (including numerous types) was donated to the Museum by Carl Adolf Georg Lauterbach, who travelled extensively in New Guinea and Melanesia. By 1914, the Herbarium had 540,000 sheets which, by 1939, had grown to ca. 600,000 sheets (Wiktor 2002; Wanat 2013). The oldest and most valuable collections of the Herbarium Silesiacum were those made by H.G. Mattuschka (1776 and 1779), A.J. Krocke (1787, 1790, 1814, 1823), A. Henschel (1830), a herbarium of fungi assembled by W.G. Schneider and an old herbarium of Paolo (Silvio) Boccone, a Cistercian monk, who moved to Wrocław in 1694 and donated his herbarium that consisted mainly of Mediterranean plants (Treviranus 1831; Rostański 1963). This herbarium is not mentioned by Stafleu et al. (1976), but is the oldest plant collection of a scientific nature in Poland. In 1935, the Herbarium Silesiacum housed over 80,000 sheets (Wanat 2013).

In autumn 1944, during the Second World War, German authorities evacuated all university botanical collections from Wrocław. The Herbarium Generale (combination of the various merged herbaria) was then located in Piotrowice castle near Kąty Wrocławskie (ca. 43 km S.W. of Wrocław), the Herbarium Lauterbachii in Siedlęcín near Jelenia Góra (ca. 95 km W. of Wrocław) and the other botanical sets in the garrison church in Oleśnica near Wrocław (ca. 27 km N.E. of Wrocław), which were unfortunately lost in a fire. The Herbarium Silesiacum was lodged, in turn, in the attic of one of the primary schools in south Wrocław (in the Tarnogaj district); however, it was not protected from destruction and the dusty and damp collection was rediscovered after the war unbound, mixed together with litter and broken glass (Wiktor 2002; Wanat 2013).

Shortly after the war, Polish authorities failed to discover traces of herbarium sets in the dilapidated buildings – these were found in the Piotrowice castle, Siedlęcín and south Wrocław only in 1946–1947, but only the Herbarium Lauterbachii was salvaged undamaged. The recovered collections were entrusted to Prof. Józef Małowski, who was invited to Wrocław from Lviv (former Poland, now in the Ukraine). The war had damaged many of the specimens and repairs were successfully undertaken by Polish botanists. Rostański (1963) assessed the war damage in both herbaria (i.e. Herbarium Generale and Herbarium Silesiacum) as, after the war, only 200,000 herbarium sheets were discovered out of 600,000 that belonged to the University in 1939, together with 30,000 herbarium sheets from the former Herbarium Silesiacum which, in 1939, housed 80,000 sheets (it was confirmed then that the oldest Silesian flora sets of H.G. Mattuschka and A.J. Krocke had been destroyed).

Currently, the collections are estimated to contain over 515,000 sheets, including ca. 410,000 vascular plants, 27,000 bryophytes, 38,400 fungi and myxomycetes, 27,000 lichens and 12,600 algae (Mirek et al. 1997; K. Świerkosz, pers. comm., 2019). The herbarium WRSB has had a turbulent history and has enormous importance in the botanical history of Poland.

The aim of this investigation was to assess the value of the WRSB botanical collection using the genus *Juncus* as a case study. Type and other nomenclaturally and

historically important specimens “hiding” in such under-appreciated collections are important for taxonomy, nomenclature and biodiversity studies. Using the WRS� herbarium, we address the importance of collections like WRS� as reservoirs of valuable data that are relevant to experts who are involved in taxonomic revision.

Methods

Assessing the significance of the WRS� collection

The WRS� herbarium is currently divided into three parts: the Herbarium Generale, the Herbarium Lauterbachii and the Herbarium Silesiacum. The Herbarium Generale (about 375,000 specimens including about 75,000 spore-bearing organisms) holds the plant and fungal material from around the world, excluding Lower Silesia, Poland, the Herbarium Lauterbachii (about 50,000 sheets) contains plants from New Guinea and Melanesia and the Herbarium Silesiacum (about 90,000 specimens) (K. Świerkosz, pers. comm., 2019) houses plants from Lower Silesia, Poland.

Generally, the importance of particular natural collections depends not only on their size, but also can be measured on the percentage or the absolute share of type specimen types (Sutory 1997). In 2017, digitalisation of the WRS� collection was initiated and was subsequently able to be accessed via GBIF.org (Świerkosz 2017); this work is on-going but only 25,000 specimens (4.9%) are currently listed in a database (K. Świerkosz, pers. comm., 2019). Therefore, we decided to assess the importance of using specimens of the genus *Juncus* (Juncaceae) stored in the Herbarium Generale (to date, no *Juncus* specimens from WRS� are included in GBIF.org database to facilitate this task). The reasons for this choice were: 1) type specimens of *Juncus* have never previously been assessed in the WRS� Herbarium; 2) the genus *Juncus* is rich in species from regions where the herbarium has geographical strengths, 311 are listed by Kirschner et al. (2002a, b) and 3) the first author of this paper is a specialist in *Juncus* taxonomy, which considerably aided the analysis of specimen status.

We evaluated the following factors (Sutory 1997): 1) the originality of the collection, including the number of types and other historically-important specimens; 2) the size of the collection, i.e. the total number of specimens; 3) the geographical scope of the collection; 4) the length of the period represented by the collection; 5) the number of duplicates and 6) the physical condition of the collection (well-prepared, well-preserved and undamaged and well-stored material with appropriate labels). Herbarium sheets with plants representing a single taxon that were gathered in the same locality and on the same date by the same collector, were regarded as duplicates. Additionally, we analysed the specimens with respect to: 1) the person who collected the material in the field; 2) the collection from which they came (i.e. to whom they belonged before accession in WRS�) and 3) the floras/exsiccatae from which they came.

We catalogued all *Juncus* specimens ourselves, paying particular attention to all types and other historical material, which we identified, based on the latest mono-

graph (Kirschner et al. 2002a, b), from which we took the current nomenclature of the genus. The localities and dates of sets for historical collections, especially those of C.F. Ecklon & C.L.P. Zeyher and J.F. Drège, were deciphered from literature (Meyer 1832; Drège 1847, 1848; Buchenau 1875, 1890, 1906), which enabled us to recognise many *Juncus* types.

The *Juncus* sets are stored in seven herbarium boxes indexed as separate fascicles, numbered 151–157 and an extra 43 herbarium sheets were kept in a separate folder. We analysed 2,192 herbarium sheets in total. We treated a separate collection with its own label as a separate herbarium sheet, as specimens from three different localities could have been mounted on one herbarium sheet (we treated these as three separate herbarium sheets). We identified 2,222 taxonomic records, since part of the material represents mixed sets. We conducted our research from scratch, since only two *Juncus* types identified in the Herbarium Generale had been previously labelled using a red label. Thus, no other *Juncus* types stood out from other herbarium sheets. Our results were also compared with those within the Global Plants Database (plants.jstor.org, accessed on 16 Apr 2020) and additional herbaria, not mentioned by Kirschner et al. (2002a, 2002b) that store other type specimens/duplicates of names we assessed, are added to the last column of Table 1 and marked with an asterisk (*). Duplicates of selected type specimens stored at WRS� were also compared with those stored in other herbaria (present in the Global Plants Database). When comparisons were made, we considered the physical condition of specimens, quantity of materials, different annotations, kinds of labels and plant parts.

Results

Type and other historically-important material

We found 78 specimens that are historically or nomenclaturally important (Table 1): two holotypes, 20 isoelectotypes, 14 isotypes, 29 syntypes (including one probable syntype of *Juncus exsertus* Buchenau (1875: 435)), three paratypes, one isoneotype, five sheets of historically-relevant material (for names not validly published) or additional material from type localities collected by the author of the name (so-called “topotypes”) and four sheets of probable original material to be analysed in the future (Fig. 1). Holotypes, isotypes and isoelectotypes constitute 46.2% of all types (and other historically- and nomenclaturally-important specimens) of *Juncus* specimens recognised at the WRS�. The most significant discovery was the identification of the three following *Juncus* types in the WRS� Herbarium (see also remarks for them in Table 1, last column of rows 46, 56, 20):

1) ISOTYPE of *Juncus lomatophyllus* Spreng. (1821: 108) [sine dato, *Bergius s.n.* (*J. lomatophyllus* Spreng., Bergius’sches Exemplar, bestimmt von K. Sprengel, 11 Jan 1875, det. Fr. Buchenau)]. – Holotype in B, destroyed. Isotype (the only duplicate known) rediscovered at WRS�.

Table 1. A list of historically- and nomenclaturally-important *Juncus* specimens identified in the Herbarium Generale at WRSL. A sequence of species alphabetically according to the basionym *Juncus* names. No. – Successive Number; N.f. – Number of fascicle (= herbarium box) at WRSL; underline text – new findings after examination of the protologues; grey rows – indicate types that were stored in Berlin and were destroyed during the WWII; * – asterisk indicates additional herbaria where Global Plants (plants.jstor.org) records duplicates.

No.	N.f.	Kind of type and type of (basionym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)	
				Locality (label data)	Date	Leg. et det.		Flora of / Herbarium
1	151	Authentic/original material of <i>Juncus antonianus</i> Steud. in W. Lechler, <i>Berberid. Amer. Austral.</i> (1857: 56), nom. inval.	<i>Juncus balticus</i> subsp. <i>andicola</i> (Hook. 1848: 8, pl. 714) Snogerup in Snogerup, Ziska & Kirschner, <i>Preslia</i> 74 (2002: 258)	PERU. S. Antonio	Jun 1854	W. Lechler 1808 (as <i>Juncus andicola</i> , 04 Dec 1887, Fr. Buchenau)	W. Lechler, Pl. Peruvianae ed. R. F. Hochenacker / Herbarium Henschelianum	Authentic/original material: Peru, San Antonio, Jun 1954, W. Lechler 1808, G, GOET, K, KW*. Rem.: After Kirschner et al. (2002b: 74) erroneous collection date of Jun 1954 to be corrected to Jun 1854.
2	151	Isonotype of <i>Juncus atratus</i> Krock., <i>Fl. Siles.</i> 1 (1787: 562)	<i>Juncus atratus</i> Krock., <i>Fl. Siles.</i> 1 (1787: 562)	POLAND, Breslau [Wrocław], Oderdämme bei Carlowitz [Karlöwice, now a settlement within Wrocław city]	10 Jul 1892	A. Callier 721	A. Callier Flora Silesiaca exsiccata / Herbarium Wagnerianum	T: Silesia, A.J. Krock, syn: not extant; Breslau, Oderdämme bei Carlowitz [Karlöwice between Wrocław and Opole, Poland], 10 Jul 1892, A. Callier [<i>Fl. Siles. Exs.</i>] 721; neo: S, designated by Kirschner et al. (2002a: 178); isoneo: L, PRC, W, WU. Rem.: After Kirschner et al. (2002a: 178) erroneous locality translated as ‘Karlöwice [village] between Wrocław and Opole, Poland’ which is on the Stobrawa river [not Odra] and is ca. 55 km SE from the Karlöwice [settlement] in Wrocław on the Odra river. The status of the type was corrected (iso to isoneo) in accordance with the <i>Shenzhen Code</i> .
3	154	Syntype of <i>Juncus brunneus</i> Buchenau, <i>Junc. S. Amer.</i> (1879: 403)	<i>Juncus ebracteatus</i> E. Mey., <i>Syn. Junc.</i> (1822: 28)	PERU. Im paludosis prope Azangaro	Jun 1854	W. Lechler 1749, det. Fr. Buchenau, 22 Jan 1879	W. Lechler, Pl. Peruvianae ed. R.F. Hochenacker / Herbarium Henschelianum	T: Bolivia, La Paz, Larecacha, 2700–3800 m, G. Mandon 1436; syn: BM, G, K, MO, NY, P; Peru, Azangaro, W. Lechler 1749; syn: BR, G, GOET, K, O, P, S.
4	152	Iso type of <i>Juncus buchenau</i> Sved., <i>Juncac. Regn. Exp. (Bib. Kongl. Svenska Vetensk.-Akad. Handl.)</i> 23(3), no 6 (1897: 9)	<i>Juncus marginatus</i> Rostk., <i>De Junco</i> (1801: 38)	BRASILIA, Brasiliae civit. Rio Grande do Sul, Quinta	07 Dec 1892	C.A.M. Lindman 857	Herb. Brasil. Regnell. Musei bot. Stockholm	T: Brazil, Rio Grande do Sul, Quinta prope opp. Rio Grande, 7 Dec 1892, C.A.M. Lindman 857; holo: S; iso: GH, W [cf. <i>Juncus ×buchenau</i> Dörf. 1897. an prius?]. Rem.: After Kirschner et al. (2002a: 48) collection No. 875 (probably to be corrected).

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
5	152	Probably original material of <i>Juncus bufonius</i> var. <i>bulophilus</i> Buchenau & Fernald, <i>Rhodora</i> 6 (1904: 39)	<i>Juncus ranarius</i> Songeon & E.P. Perrier in P.C. Billot, <i>Annot. Fl. France Allemagne</i> (1859: 192)	CANADA. Rivière du Loup	Aug 1902	W.W. Eggleston 3036	Plants of the Lower St. Lawrence	T: Canada, Quebec, Rivière du Loup, 2 Aug 1902, E.F. Williams & M.L. Fernald; holo: GH; iso: CM*, K, L, P, PH*. Paratypes (see protologue): Rivière du Loup, 15 Aug 1892, G.G. Kennedy; Rivière du Loup, 8 Aug 1902, J.R. Churchill, W.W. Eggleston, M.L. Fernald. See also protologue for many other paratypes. Rem.: After Kirschner et al. (2002b: 15) collection should be of E.F. Williams & M.L. Fernald but the herbarium label is marked as 'Type'. According to the protologue the paratype should be collected by J.R. Churchill, W.W. Eggleston, M.L. Fernald (instead of W.W. Eggleston only) and with the exact collection date (8 Aug 1902).
6	152	Holotype of <i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	<i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	POLAND. Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus	31 May 1999	J. Pročków 990531/1	Herbarium J. Pročków	T: Poland, Dolny Śląsk, Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus, 31 May 1999, J. Pročków; holo: WRSŁ; iso: WRSŁ; para: B, BIL, BM, BR, C, DBN, DRAPN, E, GOET, H, HAL, HBG, KRA, L, LAU, LG, LISU, M, MA, MSB, P, PBMA, POZ, S, TRN, TUB, WA, WRSŁ, WSRP, ZBI. Rem.: After Pročków (2010: 420–423)
7–11	152	Isotype of <i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	<i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	POLAND. Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus	31 May 1999	J. Pročków 990531/2 to 6	Herbarium J. Pročków	T: Poland, Dolny Śląsk, Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus, 31 May 1999, J. Pročków; holo: WRSŁ; iso: WRSŁ; para: B, BIL, BM, BR, C, DBN, DRAPN, E, GOET, H, HAL, HBG, KRA, L, LAU, LG, LISU, M, MA, MSB, P, PBMA, POZ, S, TRN, TUB, WA, WRSŁ, WSRP, ZBI. Rem.: After Pročków (2010: 420–423).
12	152	Paratype of <i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	<i>Juncus bulbosus</i> f. <i>submucronatus</i> Pročków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	GERMANY. Leipzig, Dahlen, 2. Teich in Richtung Schmannewitz, Teichschlamm.	03 Aug 1984	Peter Gütte 34378 (WRSŁ 69420)	Flora des Bezirkes Leipzig. Herb. Univ. Lipsiensis. Pflanzen der DDR	T: Poland, Dolny Śląsk, Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus, 31 May 1999, J. Pročków; holo: WRSŁ; iso: WRSŁ; para: B, BIL, BM, BR, C, DBN, DRAPN, E, GOET, H, HAL, HBG, KRA, L, LAU, LG, LISU, M, MA, MSB, P, PBMA, POZ, S, TRN, TUB, WA, WRSŁ, WSRP, ZBI. Rem.: After Pročków (2010: 420–423).

No.	N.f.	Kind of type and type of (basionym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium
13	152	Paratype of <i>Juncus bulbosus</i> f. <i>submucronatus</i> Proćków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	<i>Juncus bulbosus</i> f. <i>submucronatus</i> Proćków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	CZECH REPUBLIC. Bohemia meridionalis, distr. České Budějovice; ad margines turfosas stagnorum prope rivulum Borovnický potok haud procul ab vico Borovnice, copiose, ca. 450 m s. m.	24 Aug 1962	<i>J. Kučera 154</i> (WRSL 26580)	T: Poland, Dolny Śląsk, Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus, 31 May 1999, <i>J. Proćków</i> ; holo: WRSL; iso: WRSL; para: B, BIL, BM, BR, C, DBN, DRAPN, E, GOET, H, HAL, HBG, KRA, L, LAU, LG, LISU, M, MA, MSB, P, PBMA, POZ, S, TRN, TUB, WA, WRSL, WSRP, ZBI. Rem.: After Proćków (2010: 420–423).
14	152	Paratype of <i>Juncus bulbosus</i> f. <i>submucronatus</i> Proćków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	<i>Juncus bulbosus</i> f. <i>submucronatus</i> Proćków, <i>Ann. Bot. Fenn.</i> 47 (2010: 412)	POLAND, distr. Siedlce, Krzymosze, na obnażonej ziemi w borze bagiennym obok toru [on bare soil in marshy forest next to a railway track].	27 Jul 1974	<i>Z. Głowacki s. n.</i> (WRSL 35948)	T: Poland, Dolny Śląsk, Wrocław Leśnica, ad ripam et in aqua piscinae eutrophicae, situ meridiano-occidentali lacus, 31 May 1999, <i>J. Proćków</i> ; holo: WRSL; iso: WRSL; para: B, BIL, BM, BR, C, DBN, DRAPN, E, GOET, H, HAL, HBG, KRA, L, LAU, LG, LISU, M, MA, MSB, P, PBMA, POZ, S, TRN, TUB, WA, WRSL, WSRP, ZBI. Rem.: After Proćków (2010: 420–423).
15	152	Isolectotype of <i>Juncus caespiticius</i> E. Mey. in J.G.C. Lehmann, <i>Pl. Preiss.</i> 2 (1846: 47)	<i>Juncus caespiticius</i> E. Mey. in J.G.C. Lehmann, <i>Pl. Preiss.</i> 2 (1846: 47)	AUSTRALIA, ad fluvium Canning, Perth, novae Hollandiae.	02 Nov 1839	<i>Preis. (L. Preiss) 1733</i>	T: [Western Australia, Perth, Canning R.] ad fluvium Canning (Perth) novae Hollandiae, 2 Nov 1839, <i>L. Preiss [Pl. Austral. Occid.] 1733</i> ; lecto: W, designated by Kirschner et al. (2002a: 38); isolecto: BM, BREM, G*, K, L, LD*, MEL, NSW, P, W. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
16	155	Iso type of <i>Juncus caffer</i> Bertol., <i>Mem. Reale Accad. Sci. Ist. Bologna</i> 3 (1851: 253, Pl. 19, fig. 3).	<i>Juncus kraussii</i> Hochst. in C. Krauss <i>Flora</i> 28 (1845: 342) subsp. kraussii	MOZAMBIQUE. ‘Inhambane Mozambici’	06 Dec 1848	<i>Fornasinio s.n.</i>	T: Mozambique, ‘Inhambane Mocambici’, 6 Dec 1848, <i>Fornasinio</i> , holo: BOLO.
17	152	Syntype of <i>Juncus capensis</i> subsp. <i>angustifolius</i> var. <i>ecklonii</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 485) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 485)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Paludosa ad pedem montis diaboli	19 & 28 Nov 1827 [after Buchenau 1875: 485]	<i>C.F. Ecklon 35</i> (as <i>Juncus capensis</i> Thbg. subsp. <i>angustifolius</i> var. <i>ecklonii</i> Buchn, det. Fr. Buchenau, 11 Jan 1875)	T: Cape, Teufelsberg, <i>C.F. Ecklon 897, Unio Itin., no 35</i> [annotated by E. Meyer under no 18]; syn: BOL, JE*, S, W. Rem.: Additional remark by Buchenau (1875: 485): ‘Un. it. No. 35’.
18	152	Syntype of <i>Juncus capensis</i> subsp. <i>angustifolius</i> var. <i>ecklonii</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 485) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 485)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Paludosa planitiei capensis	Dec 1827 [after Buchenau 1875: 485]	<i>C.F. Ecklon 899</i> (as <i>Juncus capensis</i> Thbg. subsp. <i>angustifolius</i> var. <i>ecklonii</i> Buchn, det. Fr. Buchenau, 11 Jan 1875)	T: Cape, Teufelsberg, <i>C.F. Ecklon 897, Unio Itin., no 35</i> [annotated by E. Meyer under no 18]; syn: BOL, S, W. Rem.: Kirschner et al. (2002a: 36) did not mention this type (<i>C.F. Ecklon 899</i>) but it is listed by Buchenau (1875: 485) in the protologue of the new taxon; additionally, the specimen really seen by Buchenau (with his own handwritten label); Kirschner et al. (2002a: 36) listed var. <i>ecklonii</i> as homotypic with <i>Juncus capensis</i> var. <i>angustifolius</i> E. Mey.; syn: JE*, W*.

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
19	152	Syntype of <i>Juncus capensis</i> subsp. <i>angustifolius</i> var. <i>sphangnetorum</i> f. <i>frondescens</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 490) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 490)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Cape, Tafelberg	sine dato	<i>J.F. Drège aa</i> (det. as <i>Juncus capensis</i> var. <i>angustifolius</i> E. M.), (det. as <i>Juncus capensis</i> Thbg. subsp. <i>angustifolius</i> var. <i>sphangnetorum</i> f. <i>frondescens</i> , det. Fr. Buchenau 11 Jan 1874)	Herbarium Henschelianum	T: Cape, Tafelberg, <i>J.F. Drège aa</i> ; syn: K*, P, S, W; Gipfel des Tafelberges, <i>C.L.P. Zeyher 47</i> ; syn: B, destroyed.
20	152	Isolotype of <i>Juncus capensis</i> subsp. <i>longifolius</i> var. <i>gracilior</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 483) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 483)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Cap. B. Spei.	05 Mar 1816	<i>C.H. Bergius s.n.</i> , det. K. Sprengel (gesamm. von Bergius, det. Fr. Buchenau 11 Jan 1875)	Herbarium Henschelianum	T: Caput bonae spei, 5 Mar 1816, <i>Bergius</i> ; lecto (as holotype): B, destroyed, <i>fide</i> A.A. Obermeyer, <i>in</i> A.A. Obermeyer, J. Lewis & R.B. Faden, <i>Fl. S. Afr.</i> 4/2 (1985: 83); syn: W. Rem.: There are more specimens mentioned in the protologue of a new taxon (Buchenau, 1875: 484) thus the lectotype was designated. Isolotype (the only duplicate known) rediscovered at WRS� (the specimen includes the collection date (i.e. 5 Mar 1816), as in the the protologue). The syntype (Bergius specimen at W) does not have the collection date. The status of the type corrected (iso to islecto) in accordance with the <i>Shenzhen Code</i> .
21	152	Syntype of <i>Juncus capensis</i> subsp. <i>longifolius</i> var. <i>gracilior</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 483) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 483)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. [Cape] zwischen Paarl und Franschehoek	sine dato	<i>J.F. Drège b</i> (det. as <i>Juncus capensis</i> β. <i>angustifolius</i> E. M.), (det. as <i>J. capensis</i> subsp. <i>longifolius</i> var. <i>gracilior</i> Buchenau, det. Fr. Buchenau 11 Jan 1875)	Herbarium Henschelianum	T: Caput bonae spei, 5 Mar 1816, <i>Bergius</i> ; lecto (as holotype): B, destroyed, <i>fide</i> A.A. Obermeyer, <i>in</i> A.A. Obermeyer, J. Lewis & R.B. Faden, <i>Fl. S. Afr.</i> 4/2 (1985: 83); islecto: W. Rem.: A specimen not mentioned by Kirschner et al. (2002a: 37), but listed by Buchenau (1875: 484), thus it is a syntype because there are more specimens within the protologue of a new taxon; syn: S*. The status of the type corrected (iso to islecto) in accordance with the <i>Shenzhen Code</i> .

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
22	152	Holotype of <i>Juncus capensis</i> subsp. <i>parviflorus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 491) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 491)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. ad ripas fl. Zonder Einde, Zwelendendam	Nov 1836	<i>C. Krauss s.n.</i> (det. as <i>Juncus capensis</i> Thbg. Buchenau, leg. Ferd. Krauss, det. Fr. Buchenau, 11 Jan 1875; det. by C. Krauss as <i>Juncus cephalotes</i> Thunb.)	Herbarium Henschelianum	T: Cape, Swellendam, Rivier Zondereinde, Nov 1838, C. <i>Krauss s.n.</i> ; holo: WRS�; iso: W. Rem.: Buchenau (1875: 491) listed only one specimen stored at 'Herbarium der schlesischen Gesellschaft für vaterländische Cultur und des naturhistorischen Vereines der preussischen Rheinlande und Westfalens', i.e. in Wrocław. Thus, this holotype of the name was confirmed by the following: 1) it was observed by Buchenau on 11 Jan 1875 and 2) it is only one specimen that lacks a clearly written collection year, which was misread by Buchenau in the protologue (1875: 491) as 'Nov 1838', however, identical sheets (from Herbarium R. v. Uechtritz & Herbarium Schumann, both at WRS�) read 'Nov 1836'. Compare also with A.A. Obermeyer, <i>in</i> A.A. Obermeyer, J. Lewis & R.B. Faden, <i>Fl. S. Afr.</i> 4/2 (1985: 83). The status of the type corrected (iso to holo (for WRS�), and lecto to iso (for W)) in accordance with the <i>Shenzhen Code</i> .
23	152	Isotype of <i>Juncus capensis</i> subsp. <i>parviflorus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 491) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 491)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. ad ripas fl. Zonder-Einde, Zwelendendam	Nov 1836	<i>C. Krauss s.n.</i> (det. as <i>Juncus cephalotes</i> Thunb.)	Herbarium Schumann	Rem.: see above
24	152	Isotype of <i>Juncus capensis</i> subsp. <i>parviflorus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 491) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 491)]	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. ad ripas fl. Zonder-Einde, Zwelendendam (Cap. B. speci.)	Nov 1836	<i>C. Krauss s.n.</i> (det. as <i>Juncus cephalotes</i> Thunb.)	Herbarium R. v. Uechtritz	Rem.: see above
25	152	Synotype of <i>Juncus capitatus</i> var. <i>physcomitrioides</i> Baen., <i>Prosp. Herb. Eur.</i> (1873: 4); <i>Schriften Königl. Phys.-Ökon. Ges. Königsberg</i> 14 (1873: 16).	<i>Juncus capitatus</i> Weigel, <i>Observ. Bot.</i> (1772: 28)	POLAND. Danzig [Gdańsk], Strand bei Zoppot [Sopot]	08 Jul 1872	<i>C. Baenitz s.n.</i>	Herbarium Schumann	T: Danzig, Strand bei Zoppot [Poland, Gdańsk, Sopot], 8 Jul 1872, K.G. Baenitz; syn: L; additional authentic material from the same site: 5 Jul 1876, K.G. Baenitz [<i>Herb. Eur.</i>] 1506 (LD, W).
26	152	Additional material from type locality [collected by the author of the name] of <i>Juncus capitatus</i> var. <i>physcomitrioides</i> Baen., <i>Prosp. Herb. Eur.</i> (1873: 4); <i>Schriften Königl. Phys.-Ökon. Ges. Königsberg</i> 14 (1873: 16).	<i>Juncus capitatus</i> Weigel, <i>Observ. Bot.</i> (1772: 28)	POLAND. Danzig [Gdańsk], Ad mare balticum (Zoppot [Sopot])	05 Jul 1876	<i>C. Baenitz 1506</i>	Dr. C. Baenitz, Herbarium Europaeum	T: Danzig, Strand bei Zoppot [Poland, Gdańsk, Sopot], 8 Jul 1872, K.G. Baenitz; syn: L; additional material from the same site, collected by the author of the name: 5 Jul 1876, K.G. Baenitz [<i>Herb. Eur.</i>] 1506 (LD, W).

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
27	152	Additional material from type locality) [collected by the author of the name] of <i>Juncus capitatus</i> var. <i>physcomitrioides</i> Baen., <i>Prosp. Herb. Eur.</i> (1873: 4); <i>Schriften Königl. Phys.-Ökon. Ges. Königsberg</i> 14 (1873: 16).	<i>Juncus capitatus</i> Weigel, <i>Observ. Bot.</i> (1772: 16)	POLAND. Danzig [Gdańsk], Ad mare balticum (Zoppot [Sopot])	05 Jul 1876	<i>C. Baenitz 1506</i>	Dr. C. Baenitz, Herbarium Europaeum	T: Danzig, Strand bei Zoppot [Poland, Gdańsk, Sopot], 8 Jul 1872, <i>K.G. Baenitz</i> ; syn: L; additional material from the same site, collected by the author of the name: 5 Jul 1876, <i>K.G. Baenitz [Herb. Eur.] 1506</i> (LD, W).
28	156	Syntype of <i>Juncus cephalotes</i> var. <i>minimus</i> Hochst., <i>Flora</i> 28 (1845: 342), <i>p.p.</i>	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. in arenos. plan. Cap.	Nov [18]38	<i>C. Krauss s.n.</i>	Herbarium R. v. Uechtritz	T: [South Africa, Cape] 'in arenosis planitiei capensis', Nov 1828, <i>C. Krauss</i> ; syn: W, K [both mixed collections]. Rem.: The material needs to be revised because W & K contain mixed collections; after Kirschner et al. (2002a: 73), the collection date was Nov 1828 (to be corrected to Nov 1838).
29	156	Syntype of <i>Juncus cephalotes</i> var. <i>minimus</i> Hochst., <i>Flora</i> 28 (1845: 342), <i>p.p.</i>	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. in arenos. plan. Cap.	Nov [18]38	<i>sine coll. [C. Krauss] s.n.</i>	Herbarium Schumann	T: [South Africa, Cape] 'in arenosis planitiei capensis', Nov 1828, <i>C. Krauss</i> ; syn: W, K [both mixed collections]. Rem.: Original material was from Krauss because the identical label is on a sheet from Herbarium R. v. Uechtritz where 'Dr. Krauss' was added; the material needs to be revised because W & K contain mixed collections; after Kirschner et al. (2002a: 73), the collection date is Nov 1828 (to be corrected to Nov 1838).
30	152	Syntype of <i>Juncus cephalotes</i> var. <i>minimus</i> Hochst., <i>Flora</i> 28 (1845: 342), <i>p.p.</i>	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. in arenosis plan. Cap.	Nov [18]38	<i>sine coll. [C. Krauss] s.n.</i> (det. as <i>Juncus cephalotes</i> Thbg. var. <i>varius</i> Bchn., Fr. Buchenau, 23 Oct 1874)	Herbarium Henschelianum	T: [South Africa, Cape] 'in arenosis planitiei capensis', Nov 1828, <i>C. Krauss</i> ; syn: W, K [both mixed collections]. Rem.: Original material was from Krauss because the identical label is on a sheet from Herbarium R. v. Uechtritz where 'Dr. Krauss' was added; the material needs to be revised because W & K contain mixed collections; after Kirschner et al. (2002a: 73), the collection date is Nov 1828 (to be corrected).
31	152	Isolotype of <i>Juncus cephalotes</i> var. <i>ustulatus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 451) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 451)]	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Cape, Tafelberg	Oct 1827	<i>C.F. Ecklon Junc. 13., 2.12</i> (as <i>Juncus capensis</i> var. <i>angustifolius</i> E. M., det. C.F. Ecklon)	Herbarium Schumann	T: South Africa, Cape, Tafelberg, Oct 1827, <i>C.F. Ecklon 13</i> ; lecto: BOL, <i>fide</i> R.S. Adamson, <i>J. Linn. Soc., Bot.</i> 50 (1935: 32); islecto: W*.

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	
32	152	Syntype of <i>Juncus cephalotes</i> var. <i>ustulatus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 451) [Abh. Naturwiss. Ver. Bremen 4 (1875: 451)] or/and var. <i>varius</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 451) [Abh. Naturwiss. Ver. Bremen 4 (1875: 451)].	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Paludosa montis tabularis septentr.	Nov 1826	<i>C.F. Ecklon 901</i>	T: [South Africa, Cape] Camps Bay, <i>C.F. Ecklon s.n.</i> (BOL); syn: PRC*, S*. Rem.: Mixed material containing var. <i>ustulatus</i> Buchenau & var. <i>varius</i> Buchenau, mentioned in both protologues, to be analysed.
33	152	Syntype of <i>Juncus cephalotes</i> var. <i>varius</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 451) [Abh. Naturwiss. Ver. Bremen 4 (1875: 451)].	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Worcester beim Waterfall	sine dato	<i>C.F. Ecklon & C.L.P. Zeyher Junc. 8, 1. 11</i> (as <i>Juncus capensis</i> var. <i>minimus</i> La Harphe, det. <i>Ecklon & Zeyher</i>)	T: [South Africa, Cape] Camps Bay, <i>C.F. Ecklon s.n.</i> (BOL). Rem.: Kirschner et al. (2002a: 73) did not mention this type, but it is listed by Buchenau (1875: 452) within the protologue of the new taxon; however Buchenau (1875: 452) indicates stunted stamens in this material.
34	153	Syntype of <i>Juncus clausonis</i> Trab. in J.A. Battandier & L.C. Trabut, <i>Fl. Algérie</i> , ed. 2 (1895: 84).	<i>Juncus striatus</i> Schousb. ex E. Mey., <i>Syn. Junc.</i> (1822: 27)	ALGERIA. Ain Taya (Alger)	Jul 1889	<i>J.A. Battandier & L.C. Trabut 586</i>	T: [Algeria] Ain Taya près Alger, Jun 1888, <i>L.C. Trabut</i> ; syn: G; Jul 1889, <i>J.A. Battandier & L.C. Trabut 586</i> ; syn: G, L, MPU*.
35	157	Isotype of <i>Juncus delicatulus</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 304)	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Africa australis [Cape, Grahamstown Valley]	sine dato	<i>J.F. Drège 1604e</i>	T: Africa australis [Cape, Grahamstown Valley], <i>J.F. Drège 1604e</i> ; holo: P; iso: G, S, W.
36	152	Syntype of <i>Juncus dregeanus</i> var. <i>conglomeratus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 463) [Abh. Naturwiss. Ver. Bremen 4 (1875: 463)].	<i>Juncus dregeanus</i> Kunth, <i>Enum. Pl.</i> 3 (1841: 344) subsp. dregeanus	SOUTH AFRICA. Cap. Bon. Spei (Hassagaibosch [Assegaibos])	sine dato	<i>C.L.P. Zeyher (C.F. Ecklon & C.L.P. Zeyher) Junc. 10, 26.1</i> (det. as <i>Juncus cephalotes</i> L'Harpe var. <i>conglomerata</i> Nees, det. Zeyher)	T: Hassagaibosch [Assegaibos], <i>C.F. Ecklon & C.L.P. Zeyher 10</i> ; syn: BOL, W; Albany, <i>C.F. Ecklon</i> ; syn: <i>n.v.</i>
37	156	Probable syntype of <i>Juncus exsertus</i> Buchenau, <i>Monogr. Juncac. Cap</i> (1875: 435) [Abh. Naturwiss. Vereine Bremen 4 (1875: 435)]	<i>Juncus exsertus</i> Buchenau, <i>Monogr. Juncac. Cap</i> (1875: 435) [Abh. Naturwiss. Vereine Bremen 4 (1875: 435)]	SOUTH AFRICA. Worcester, Waterfall	sine dato	<i>C.F. Ecklon & C.L.P. Zeyher 1. 11</i> (det. as <i>Juncus punctorius</i> Thbg)	T: [Cape Provinces, Swartkops River] Zwartkops Rivier, <i>C.L.P. Zeyher 103</i> ; syn: B [destroyed after having been selected as type by R.S.Adamson, <i>J. Linn. Soc. Bot. 50</i> (1935: 15)], BOL; Worcester, Waterfall, <i>C.F. Ecklon & C.L.P. Zeyher</i> [as <i>Juncus punctorius 1. 11</i>] <i>p.p.</i> ; syn: B [destroyed], PRE; Zondagsrivier bei Graaff-Reinet [Sundays River at Graaff-Reinet], <i>H. Bolus 188</i> ; syn: BOL, K*; 'Camdebooosberg, 4–5000 Fuss', <i>J.F.Drège [Juncus oxycarpus c']</i> ; syn: W [only!]. Rem.: <i>C.F. Ecklon & C.L.P. Zeyher</i> [as <i>Juncus punctorius 1. 11</i>] pro parte as a syntype of the name (Kirschner et al. 2002a: 239).
38	153	Syntype of <i>Juncus glaucus</i> var. <i>acutissimus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 417)	<i>Juncus inflexus</i> L., <i>Sp. Pl.</i> (1753: 326)	SOUTH AFRICA. Cape, Wodehouse, Klein Buffels Vallei near Gaatjie	sine dato	<i>J.F. Drège 8796 c</i>	T: Cape, Wodehouse, Klein Buffels Vallei near Gaatjie, <i>J.F. Drège 8796c</i> ; syn: E*, LE*, LD, S, W.

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium
39	152	Syntype of <i>Juncus inaequalis</i> var. <i>viridescens</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 455) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 455)]	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Worcester beim Waterfall	sine dato	<i>C.F. Ecklon Junc 14., 1.11</i>	T: South Africa, Cape, Swellendam, <i>C.L.P. Zeyher 4319</i> ; syn: BOL, K*, W [p.p., ut <i>Juncus isolepoides</i> Nees, <i>nom. inval.</i>]; Hottentotts-Holland, <i>C.L.P. Zeyher 46</i> ; syn: BOL, W, S*; <i>C.F. Ecklon 14</i> ; syn: <i>n.v.</i>
40	152	Probable original material of <i>Juncus ximundatus</i> Drejer, <i>Naturhist. Tidsskr.</i> 2 (1838: 181)	<i>Juncus balticus</i> Willd., <i>Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk.</i> 3 (1809: 298) subsp. balticus × <i>filiformis</i> L., <i>Sp. Pl.</i> (1753: 326)	DENMARK. Thy, Jyllandia	sine dato	<i>Drejer s.n.</i>	T: <i>n.v.</i> – BM*, C*, W*. Rem.: The protologue of <i>Juncus ximundatus</i> Drejer provided the following sites: Rors Klit in Thy district and at Bulbjerg (both found by Drejer) and Kollerup Klit in Vesterhanherred (found by Poulsen). However, they are cited only as geographic localities and not as specimens. Moreover, the date of collection in the protologue is July 1837. The specimen at WRS� was collected in Thy district, but no exact locality or collection date was provided; after Kirschner et al. (2002b: 141): type – <i>n.v.</i> [<i>non vidj.</i>]. After Kirschner et al. (2002b: 141) place of publication is ‘ <i>Bot. Tidsskr.</i> ’ to be corrected to <i>Naturhistorisk Tidsskrift (Copenhagen)</i> , i.e. ‘ <i>Naturhist. Tidsskr.</i> ’.
41	154	Isolectotype of <i>Juncus involucreatus</i> Steud. ex Buchenau, <i>Abh. Naturwiss. Vereine Bremen</i> 4 (1875: 121)	<i>Juncus microcephalus</i> Humb., Bonpl. & Kunth., <i>Gen. Sp.</i> 1 (1816: 237 [Quarto], 190 [Folio])	PERU. Tabina	Jul 1854	<i>W. Lechler 2078</i>	T: Peru, Tabina, 1854, <i>W. Lechler 2078</i> ; lecto: GOET, <i>fide</i> H. Balslev, <i>Fl. Neotrop. Monogr.</i> 68 (1996: 106); isolecto: G*, K, KW*, LE*, MO, O, S. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
42	154	Isolectotype of <i>Juncus kotschy</i> Boiss. in C.G.T. Kotschy, <i>Pl. Persiae Austr.</i> [exsiccate series edited by R.F. Hohenacker, printed label description], no. 446 (1845) & Boissier, <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	<i>Juncus fontanesii</i> subsp. kotschy (Boiss.) Snogerup in K.H. Rechinger, <i>Fl. Iranica</i> 75 (1971: 25)	IRAN. In paludosi ad rad. M. Sabst-Buschom, pr. U. Schiras	31 May 1842	<i>C. G. T. Kotschy 446</i>	T: [Iran] m. Sabst-Buschon pr.[ope] u.[rbem] Schiras, 31 May 1842, <i>C. G. T. Kotschy [Pl. Pers. Austr.] 446</i> ; lecto: G-BOISS, <i>fide</i> S. Snogerup, in K.H. Rechinger, <i>Fl. Iranica</i> 75 (1971: 25); isolecto: B*, BM, CAS*, CGE, CORD*, E*, FI*, G, GOET*, HAL*, K, KW*, MO*, P, PR, S*, UPS. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
43	154	Isolectotype of <i>Juncus kotschy</i> Boiss. in C.G.T. Kotschy, <i>Pl. Persiae Austr.</i> [exsiccate series edited by R.F. Hohenacker, printed label description], no. 446 (1845) & Boissier, <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	<i>Juncus fontanesii</i> subsp. kotschy (Boiss.) Snogerup in K.H. Rechinger, <i>Fl. Iranica</i> 75 (1971: 25)	IRAN. In paludosi ad rad. M. Sabst-Buschom, pr. U. Schiras	31 May 1842	<i>C. G. T. Kotschy 446</i> (det. Fr. Buchenau, 31 Jan 1875, as <i>J. kotschy</i>)	T: [Iran] m. Sabst-Buschon pr.[ope] u.[rbem] Schiras, 31 May 1842, <i>C. G. T. Kotschy [Pl. Pers. Austr.] 446</i> ; lecto: G-BOISS, <i>fide</i> S. Snogerup, in K.H. Rechinger, <i>Fl. Iranica</i> 75 (1971: 25); isolecto: B*, BM, CAS*, CGE, CORD*, E*, FI*, G, GOET*, HAL*, K, KW*, MO*, P, PR, S*, UPS. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .

No.	N.f.	Kind of type and type of (basionym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
44	154	Isolectotype of <i>Juncus kraussii</i> Hochst. in C. Krauss <i>Flora</i> 28 (1845: 342)	<i>Juncus kraussii</i> Hochst. in C. Krauss <i>Flora</i> 28 (1845: 342)	SOUTH AFRICA. ad ripas Notsinakama R., distr. George	Jan 1839	C. Krauss s.n. (<i>C. Kraussii</i> Specimen authenticum, Fr. Buchenau, 11 Jan 1875)	Herbarium Henschelianum	T: South Africa, George Distr., Notsinakama R., Jan 1839, <i>C. Krauss</i> ; lecto: G-BOIS, <i>fide</i> S.Snogerup, <i>Willdenowia</i> 23 (1993: 57); isolecto: M, TUB*. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
45	154	Isolectotype of <i>Juncus kraussii</i> Hochst. in C. Krauss <i>Flora</i> 28 (1845: 342)	<i>Juncus kraussii</i> Hochst. in C. Krauss <i>Flora</i> 28 (1845: 342)	SOUTH AFRICA. ad ripas Notsinakama R., distr. George	Jan 1839	C. Krauss s.n.	Herbarium Schumann	T: South Africa, George Distr., Notsinakama R., Jan 1839, <i>C. Krauss</i> ; lecto: G-BOIS, <i>fide</i> S.Snogerup, <i>Willdenowia</i> 23 (1993: 57); isolecto: M, TUB*. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
46	154	Iso type of <i>Juncus lomatophyllus</i> Spreng., <i>Neue Entdeck. Pflanzenk.</i> 2 (1821: 108)	<i>Juncus lomatophyllus</i> Spreng., <i>Neue Entdeck. Pflanzenk.</i> 2 (1821: 108)	SOUTH AFRICA. Cap. B. Spe.	sine dato	C. H. Bergius s.n. (<i>J. lomatophyllus</i> Spreng., Bergius'sches Exemplar, bestimmt von K. Sprengel, 11 Jan 1875, det. Fr. Buchenau)	Herbarium Henschelianum	T: 'in promontorio bonae spei' [Cape Peninsula], <i>Bergius</i> ; holo: B, destroyed. Rem.: After Kirschner et al. (2002a: 31): holotype – B, destroyed. Isotype (the only duplicate known) rediscovered at WRSI.
47	156	Syntype of <i>Juncus mauritanicus</i> Trab., <i>Bull. Soc. Bot. France</i> 34 (1887: 396)	<i>Juncus punctatorius</i> L. f., <i>Suppl. Pl.</i> (1781: 208)	ALGERIA. Aïn el Hadjar [Oran]	20 Jul 1887	J.A. Battandier & L.C. Trabut 294	Battandier et Trabut, Pl. d'Algérie	T: [Algeria, Oran] Aïn el Hadjar, 1100 m, 20 Jul 1887; J.A. Battandier & L.C. Trabut [<i>Pl. Alger.</i>] 294; syn: G, L, MPU*, PR, WU; [Algeria] Batna, B. Balansa [<i>Pl. Alger.</i>] 739; syn: n.v.
48	156	Authentic/original material of <i>Juncus minae</i> Strobl ex Nyman, <i>Consp. Fl. Eur.</i> (1882: 749), <i>nom. inval.</i>	<i>Juncus pygmaeus</i> Rich. ex Thuill., <i>Fl. Env. Paris</i> , ed. 2 (1800: 178)	ITALY. Ad oram maris Tyrrheni prope Finale	11 Apr 1874	P. Gabriel Strobl s.n.	Flora nebrodensis / Herbarium M. Winkler	Authentic/original material: [Italy, Sicily] Flora Nebrodensis, prope Finale, G. Strobl (K, PR)
49	156	Authentic/original material of <i>Juncus minae</i> Strobl ex Nyman, <i>Consp. Fl. Eur.</i> (1882: 749), <i>nom. inval.</i>	<i>Juncus pygmaeus</i> Rich. ex Thuill., <i>Fl. Env. Paris</i> , ed. 2 (1800: 178)	ITALY. Ad oram maris Tyrrheni prope Finale	11 Apr 1874	P. Gabriel Strobl s.n. (det. Uechtritz, as <i>J. pygmaeus</i> Th.)	Flora nebrodensis / Herbarium R. v. Uechtritz	Authentic/original material: [Italy, Sicily] Flora Nebrodensis, prope Finale, G. Strobl (K, PR)
50	155	Isolectotype of <i>Juncus monticola</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 301)	<i>Juncus wallichianus</i> J. Gay ex Laharpe, <i>Essai Monogr. Junc.</i> (1825: 51)	INDIA. In montibus Nilagiri	sine dato	R.F. Hohenacker 951	Pl. Indiae or. (M. Nilagiri) Ed. R.F. Hohenacker. 1851 / Herbarium Henschelianum	T: [India] in montibus Nilagiri, R.F. Hohenacker [<i>Pl. Ind. Orient.</i>] 951; lecto: P, <i>fide</i> K.L. Wilson & L.A.S. Johnson, <i>Telopea</i> 9 (2001: 364); isolecto: E, G*, JE*, K, L, MPU*, P, PR, S*, W. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
51	155	Isolectotype of <i>Juncus monticola</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 301)	<i>Juncus wallichianus</i> J. Gay ex Laharpe, <i>Essai Monogr. Junc.</i> (1825: 51)	INDIA. In montibus Nilagiri	sine dato	R.F. Hohenacker 951	Pl. Indiae or. (M. Nilagiri) Ed. R.F. Hohenacker. 1851 / Herbarium Felsmann	T: [India] in montibus Nilagiri, R.F. Hohenacker [<i>Pl. Ind. Orient.</i>] 951; lecto: P, <i>fide</i> K.L. Wilson & L.A.S. Johnson, <i>Telopea</i> 9 (2001: 364); isolecto: E, G*, JE*, K, L, MPU*, P, PR, S*, W. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)				T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium	
52	155	Isolectotype of <i>Juncus monticola</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 301)	<i>Juncus wallichianus</i> J. Gay ex Laharpe, <i>Essai Monogr. Junc.</i> (1825: 51)	INDIA. In montibus Nilagiri	sine dato	<i>R.F. Hohenacker 951</i>	Pl. Indiae or. (M. Nilagiri) Ed. R.F. Hohenacker. 1851 / Herbarium R. v. Uechtritz	T: [India] in montibus Nilagiri, <i>R.F. Hohenacker [Pl. Ind. Orient.] 951</i> ; lecto: P, <i>fide</i> K.L. Wilson & L.A.S. Johnson, <i>Telopea</i> 9 (2001: 364); isolecto: E, G*, JE*, K, L, MPU*, P, PR, S*, W. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
53	151	Syntype of <i>Juncus multibracteatus</i> Tineo in G. Gussone, <i>Fl. Sicul. Prodr. Suppl.</i> (1832: 105)	<i>Juncus acutus</i> L., <i>Sp. Pl.</i> (1753: 325) subsp. acutus	ITALY. In humentibus Castronuovo	sine dato	<i>Todaro 556</i>	Todaro Flora Sicula exiccata / Herbarium M. Winkler	T: [Italy] 'In humentibus Castronuovo', <i>A. Todaro 556</i> ; syn: BM, BR*, FI, K, W.
54	153	Probable original material of <i>Juncus xobotritorum</i> Rothm., <i>Wiss. Zeitschr. Univ. Greifswald</i> 14 (1965: 79)	<i>Juncus xobotritorum</i> Rothm. <i>Wiss. Zeitschr. Univ. Greifswald</i> 14 (1965: 79) (= <i>J. balticus</i> Willd. subsp. <i>balticus</i> x <i>J. effusus</i> L. subsp. <i>effusus</i>)	GERMANY. Prov. Mecklenburg, Dünenmoor zwischen Wustrow und Dierhagen/Fischland-Darss	15 Sep 1961	<i>U. Schneider s.n.</i>	Flora Germanica / Herbarium Ulrike Schneider	T: [Germany, Mecklenburg] inter Wustrow et Dierhagen prope Ribnitz Megalopolitanae, 16 Sep 1961, <i>W. Rothmaler & U. Schneider</i> ; holo: <i>n.v.</i> [not given in the protologue; probably JE or GFW] Rem.: After Kirschner et al. (2002b: 141) the type material was collected on 16 Sep 1961, and by <i>W. Rothmaler & U. Schneider</i> .
55	155	Probable original material of <i>Juncus obtusatus</i> Engelm., <i>Trans. Acad. Sci. St. Louis</i> 2 (1868: 495), <i>nom. illeg., non Schult.</i> (1814), <i>nom. illeg.</i>	<i>Juncus covillei</i> var. <i>obtusatus</i> [Engelmann] C.L. Hitchc. in C.L. Hitchcock & al., <i>Vasc. Pl. Pacif. Northw.</i> 1 (1969: 193)	USA. California	sine dato	<i>H.N. Bolander s.n., det. Fr. Buchenau</i>	Herbarium Henschelianum	T: California, Mariposa, Big Tree Grove, <i>H.N. Bolander [G. Engelmann, Herb. Junc. Bor.-Amer. Norm.] 42</i> ; syn: AAU, CAS*, DAO*, G*, K*, LE*, MO, NY*, PH*, PR, USCH*, <i>H.N. Bolander 6028</i> ; syn: MO. Rem.: A handwritten label by Fr. Buchenau.
56	155	Syntype of <i>Juncus oxycarpus</i> E. Mey. ex Kunth, <i>Enum. Pl.</i> 3 (1841: 336)	<i>Juncus oxycarpus</i> E. Mey. ex Kunth, <i>Enum. Pl.</i> 3 (1841: 336)	SOUTH AFRICA. Cap. b. spi. ([Cape Provinces] Liesbeek R)	sine dato	<i>C.H. Bergius s.n.</i> (det. Fr. Buchenau 11 Jan 1875 & remark by Buchenau: Bergiusches Exemplar mit der (falschen) Bestimmung v. K. Sprengel); det. by K. Sprengel as <i>Juncus punctatorius</i>	Herbarium Henschelianum	T: [Cape Provinces] Liesbeek R., <i>C.H. Bergius</i> ; syn: B [destroyed]; Paarl, Berg Rivier, <i>J.F. Drège a</i> ; syn: K, P. Rem.: A syntype at WRS� is shown according to an original publication of Kunth (1841: 337). This is a new syntype (and its only known duplicate) discovered at WRS�.
57	156	Syntype of <i>Juncus parvulus</i> E. Mey. ex Buchenau, <i>Monogr. Junc. Cap</i> (1875: 447) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 447)]	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Cape, Namaqualand, Modderfontein	05 Nov 1830	<i>J.F. Drège 2472b</i>	Herbarium Henschelianum	T: South Africa, Cape, Namaqualand, Modderfontein, 5 Nov 1830, <i>J.F. Drège 2472b</i> ; syn: BM*, BOL*, E*, G*, K, L, LD*, LE*, NY*, PR, S, TUB*.

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium
58	156	Syntype of <i>Juncus persicus</i> Boiss., <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	<i>Juncus persicus</i> Boiss., <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	IRAN. In planitie edita Kakan m. Kuh-Daëna	17 Jul 1842	<i>C.G.T. Kotschy</i> 683	T: [Iran] Kakun M Kuh-e Dinar, <i>C.G.T. Kotschy</i> 683; syn: BM, CGE, E, FI*, G, KW*, LE*, MO*, PR, WAG*.
59	156	Syntype of <i>Juncus persicus</i> Boiss., <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	<i>Juncus persicus</i> Boiss., <i>Diagn. Pl. Orient.</i> , ser. 1, 7 (1846: 101)	IRAN. In planitie edita Kakan m. Kuh-Daëna	sine dato	<i>C.G.T. Kotschy</i> 683 (det. Fr. Buchenau, 04 Feb 1875)	T: [Iran] Kakun M Kuh-e Dinar, <i>C.G.T. Kotschy</i> 683; syn: BM, CGE, E, FI*, G, KW*, LE*, MO*, PR, WAG*.
60	156	Syntype of <i>Juncus pictus</i> Steud., <i>Sym. Pl. Glumac.</i> 2 (1855: 305)	<i>Juncus pictus</i> Steud., <i>Sym. Pl. Glumac.</i> 2 (1855: 305)	SOUTH AFRICA. Cape, Namaqualand, Kamiesberg, Leliefontein	sine dato	<i>J.F. Drège</i> 2472a	T: South Africa, Cape, Namaqualand, Kamiesberg, Leliefontein, <i>J.F. Drège</i> 2472a; syn: BM*, BOL, E*, G, K, KW*, L, LD*, NY*, P, PR, S.
61	156	Syntype of <i>Juncus sikkimensis</i> var. <i>pseudocastaneus</i> Lingelsh., in <i>W.Limpricht, Repert. Spec. Nov. Regni Veg. Beib.</i> 12: 316 (1922)	<i>Juncus sikkimensis</i> Hook. f., <i>Fl. Brit. India</i> 6 (1892: 399)	CHINA/INDIA [?]. Tatsienlu [Kangding]-Dawo [Dawu]. Gata (Tailing) auf der Passalm Dshaschi la ka [Tschaschilaka] (Hai tse schan) am Dshará (Iara ri), 4360 m	02 Jul 1914	<i>W. Limpricht</i> 1869, det. Lingelsheim, as <i>Juncus sikkimensis</i> var. <i>pseudocastaneus</i> Lingelsh. (on the additional label)	T: Ngata (Taining), Tschaschilaka, zwischen Tatsienlu [Kangding] und Dawo [Dawu], Hai tse schan am Dshara, 2 Jul 1914, <i>W. Limpricht</i> 1869; syn: WRSL, <i>n.v.</i> , WU. Rem.: The specimen at WRSL is mentioned by Kirschner et al. (2002a: 126) but marked as <i>n.v.</i> [<i>non vidit</i>].
62	152	Isolectotype of <i>Juncus ranarius</i> Songeon & E.P. Perrier in <i>P.C. Billot, Annot. Fl. France Allemagne</i> (1859: 192)	<i>Juncus ranarius</i> Songeon & E.P. Perrier in <i>P.C. Billot, Annot. Fl. France Allemagne</i> (1859: 192)	FRANCE. Moutiers (Savoie)	31 Jun & 24 Aug 1858	<i>Perrier</i> 1787 (det. J. Stasiak, 29 Jan 1975, as <i>Juncus ambiguus</i> Guss. = <i>J. ranarius</i> Song. et Perr.)	T: France, Savoie, Moutiers, 31 Jun & 21 Aug 1858, <i>A. Perrier</i> ; lecto: P, <i>fide</i> T.A. Cope & C.A. Stace, <i>Watsonia</i> 12 (1978: 123); isolecto: BM*, G, K, LD, W. Rem.: The status of this isolectotype should be validated while taking into account the following: 1) the analysis of the lectotype at P and 2) whether the lectotypification by Cope & Stace (1978: 123) is valid (the researchers did not specify which specimen at P they selected as a type and the original material of the name is usually very extensive).
63	156	Syntype of <i>Juncus rupestris</i> f. <i>robusta</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 442) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 442)]	<i>Juncus rupestris</i> Kunth, <i>Enum. Pl.</i> 3 (1841: 344)	SOUTH AFRICA. Cape, Kamiesberge, Eselsfontein	sine dato	<i>J.F. Drège</i> 2471a	Kirschner et al. (2002b: 15) erroneously noted the page of the lectotype indication as 127 and it should be corrected to 123. T: South Africa, Cape, Kamiesberge, Eselsfontein, <i>J.F. Drège</i> 2471a; syn: BOL, E*, G, K, LD, PR, S.
64	156	Isolectotype of <i>Juncus schimperii</i> Hochst. ex A. Rich., <i>Tent. Fl. Abyssin.</i> 2 (1851: 338)	<i>Juncus punctorius</i> L. f., <i>Suppl. Pl.</i> (1781: 208)	ETHIOPIA. In ripis uliginosis Adoam	01 Dec 1837	<i>W. Schimper</i> 56 (det. Fr. Buchenau, 11 Jan 1875 as <i>Juncus punctorius</i> Thbg.)	T: [Ethiopia]. In ripis uliginosis prope Adoam [Adua], 1 Dec 1837, <i>W. Schimper</i> [<i>C.F. Hochstetter, Herb. Un. It. Abyss.</i>] 56; lecto: P [as 'holo'], <i>fide</i> K.A. Lye, in S. Edwards, Sebsebe D. & I. Hedberg, <i>Fl. Ethiop. & Eritr.</i> 6 (1997: 389); isolecto: BR*, G*, HAL*, M*, MPU*, K, KW*, LG*, S*, TUB*, WAG*, WU. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .

No.	N.f.	Kind of type and type of (basionym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.:)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium
65	154	Syntype of <i>Juncus schlagintweitii</i> Buchenau, <i>Nachr. Königl. Ges. Wiss. Göttingen Geschüftl. Mitt.</i> 13 (1869: 255)	<i>Juncus himalensis</i> Klotzsch in J.F. Klotzsch & C.A.F. Garcke, <i>Bot. Ergebn. Reise Waldemar</i> (1862: 60, tab. 97)	INDIA. Western Himálaya, prov. Gärhvál, Néloug viá Múkba across the Damdár or Hat ka Tsáura Pass tu Ussilla in the Tons Valley	26 Sep to 06 Oct 1855	<i>A. & H. Schlagintweit 9708</i> , det. Fr. Buchenau	T: [Kashmir] Tibet, Dras, 'Matai up to the Tsoje Pass', 14 Oct 1868, <i>A. & H. Schlagintweit 6668</i> ; syn: W, US*; India, Garhwal, 'Neloug via Mukba across the Damdar', 6 Oct 1855; <i>A. & H. Schlagintweit 9708</i> ; syn: <i>n.v.</i>
66	156	Syntype of <i>Juncus schlechteri</i> Buchenau, <i>Bot. Jahrb. Syst.</i> 24 (1898: 459)	<i>Juncus cephalotes</i> Thunb., <i>Prodr. Pl. Cap.</i> (1794: 66)	SOUTH AFRICA. Terra Capensis, Regio occidentalis, Bain's Kloof	Nov 1896	<i>F.R. Schlechter 9154</i>	T: South Africa, Cape, Bain's Kloof, <i>F.R. Schlechter 9154</i> ; syn: BM*, BOL, BR*, E*, G*, L, LD, LE*, PR, PRE, S, WAG*.
67	157	Isotype of <i>Juncus singularis</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 302)	<i>Juncus singularis</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 302)	SOUTH AFRICA. Cape, between Vanstadensberg and Bethelsdorp	1830	<i>J.F. Drège 1604b</i>	T: Cape, between Vanstadensberg and Bethelsdorp 1830, <i>J.F. Drège 1604b p.p.</i> [some gatherings with <i>Juncus dregeanus</i>]; holo: P; iso: B [destroyed, but picture deposited at W], G, S, W. Rem.: Mentioned by Kirschner et al. (2002a: 57) as a doubtful taxon.
68	156	Syntype of <i>Juncus sonderianus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 476) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 476)]	<i>Juncus sonderianus</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 476) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 476)]	SOUTH AFRICA. [Cape] Port Elizabeth	sine dato	<i>J.F. Drège e</i> (det. F. Buchenau as <i>Juncus sonderianus</i> Buchenau, 11 Jan 1875; det. J.F. Drège as <i>Junc. cap. β. angustifol.</i> E.M.)	T: [Cape] Port Elizabeth, <i>J.F. Drège e</i> ; syn: E*, G, HBG*, K, LD, LE*, P, S*, W [J.F. Drège e' was generally proposed as a type by Adamson, <i>J. Linn. Soc., Bot.</i> 50 (1935: 26)]; [Cape] bei Cap Rectief und Port Elizabeth, <i>C.F. Ecklon & C.L.P. Zeyher 9</i> ; syn: BOL, LD*, W, S; <i>C.F. Ecklon & C.L.P. Zeyher 780</i> ; syn: <i>n.v. – W*</i> .
69	156	Isolectotype of <i>Juncus sparganiiifolius</i> Boiss. & Kotschy ex Buchenau, <i>Krit. Verz. Juncac.</i> (1879: 88)	<i>Juncus sparganiiifolius</i> Boiss. & Kotschy ex Buchenau, <i>Krit. Verz. Juncac.</i> (1879: 88)	TURKEY. In alvei glareosis dispersa et rara supra Ursusa pagum (Hatay, Arsuz)	02 Jul 1862	<i>C. G. T. Kotschy 102</i>	T: Plantae Syriae borealis ex Amano occidentali supra Arsus, supra Ursusa pagum [Turkey, Hatay, Arsuz], 2 Jun 1862, <i>C.G.T. Kotschy 102</i> ; lecto: Z, <i>fide</i> S. Snogerup, in P.H. Davis, <i>Fl. Turkey</i> 9 (1986: 19); isolecto: BM, G*, JE*, K, L, LE*, P, W [One of four isotype specimens from W bears a note in Buchenau's hand: 'An excellent new species' [translated], and should be given preference]. Rem.: The status of the type corrected (iso to isolecto) in accordance with the <i>Shenzhen Code</i> .
70	156	Isolectotype of <i>Juncus sprengelii</i> Nees ex Buchenau var. <i>gracilior</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 449) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 449)]	<i>Juncus stenopetalus</i> Adamson, <i>J. S. African Bot.</i> 8 (1942: 273)	SOUTH AFRICA. Worcester, Waterfall	sine dato	<i>C. F. Ecklon & C.L.P. Zeyher 11, 1.12</i> (det. Fr. Buchenau, as <i>J. sprengelii</i> N. ab. Es., 11 Jan 1875)	T: South Africa, Cape, Tulbagh Waterfall, <i>C.F. Ecklon & C.L.P. Zeyher 11</i> ; lecto: BOL, <i>fide</i> A.A. Obermeyer, in A.A. Obermeyer, J. Lewis & R.B. Faden, <i>Fl. S. Afr.</i> 4/2 (1985: 88); isolecto: LD, S, W.
71	156	Isolectotype of <i>Juncus sprengelii</i> Nees ex Buchenau var. <i>gracilior</i> Buchenau, <i>Monogr. Junc. Cap</i> (1875: 449) [<i>Abh. Naturwiss. Ver. Bremen</i> 4 (1875: 449)]	<i>Juncus stenopetalus</i> Adamson, <i>J. S. African Bot.</i> 8 (1942: 273)	SOUTH AFRICA. Worcester, Waterfall	sine dato	<i>C. F. Ecklon & C.L.P. Zeyher 11, 1.12</i>	T: South Africa, Cape, Tulbagh Waterfall, <i>C.F. Ecklon & C.L.P. Zeyher 11</i> ; lecto: BOL, <i>fide</i> A.A. Obermeyer, in A.A. Obermeyer, J. Lewis & R.B. Faden, <i>Fl. S. Afr.</i> 4/2 (1985: 88); isolecto: LD, S, W.

No.	N.f.	Kind of type and type of (basonym)	Current name	Herbarium label data (original spelling)			T: Type citation from protologue, including herbaria acronyms (according to Kirschner et al. (2002a, b)) and additional remarks (Rem.)
				Locality (label data)	Date	Leg. et det.	Flora of / Herbarium
72	152	Isolectotype of <i>Juncus sulcatus</i> Hochst. in C. Krauss, <i>Flora</i> 28 (1845: 342)	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Ad rivulos in Zitzikama, Uitenhage	Mar 1839	C. Krauss s.n. (det. Fr. Buchenau, as <i>J. capensis</i> Thbg. subsp. <i>angustifolius</i> var. <i>flaccidus</i> Behn., f. <i>depaup.</i> , 11 Jan 1875)	Herbarium Henschelianum
73	152	Isolectotype of <i>Juncus sulcatus</i> Hochst. in C. Krauss, <i>Flora</i> 28 (1845: 342)	<i>Juncus capensis</i> Thunb., <i>Prodr. Pl. Cap.</i> 1 (1794: 66)	SOUTH AFRICA. Ad rivulos in Zitzikama, Uitenhage	Mar 1839	C. Krauss s.n.	Herbarium Schumann
74	157	Syntype of <i>Juncus sylvaticus</i> var. <i>multiflorus</i> Rochel, <i>Pl. Banat. Rar.</i> (1828: 31, tab. 1) & <i>Juncus rochelianus</i> Schult. & Schult. f., <i>Syst. Veg.</i> 7(2) (1830: 1658)	<i>Juncus thomasi</i> Ten., <i>App. Ind. Sem.</i> (1827: 1 sine pag.)	SERBIA. Banatu [Banatus]	1815	A. Rochel s.n.	Herbarium R. v. Uechtritz
75	151	Isolectotype of <i>Juncus tommasinii</i> Parl., <i>Fl. Ital.</i> 2 (1852: 315)	<i>Juncus littoralis</i> C.A. Mey., <i>Verz. Pfl. Casp. Meer.</i> (1831: 34)	ITALY. [...] bog, Monfalcone Grado	sine dato	M. Tommasini s.n.	Ex herbario Florae Illyrico-litoralis / Herbarium R. v. Uechtritz 27
76	157	Isotype of <i>Juncus trifloris</i> var. <i>brachystylus</i> Engelm., <i>Trans. Acad. Sci. St. Louis</i> 2 (1868: 492)	<i>Juncus kelloggii</i> Engelm., <i>Trans. Acad. Sci. St. Louis</i> 2 (1868: 494)	USA. California, Mendocino Co., Ukiah	May 1866	H.N. Bolander & Kellogg 4646, det. Fr. Buchenau	Herbarium Henschelianum
77	157	Isolectotype of <i>Juncus trifloris</i> var. <i>stylosus</i> Engelm., <i>Trans. Acad. Sci. St. Louis</i> 2 (1868: 492)	<i>Juncus trifloris</i> Engelm., <i>Trans. Acad. Sci. St. Louis</i> 2 (1868: 492)	USA. California, Yosemite Valley, De Long's ranch	10 Jun 1866	H.N. Bolander & Kellogg 4864, det. Fr. Buchenau	Herbarium Henschelianum
78	156	Isotype of <i>Juncus valdiviae</i> Steud., <i>Syn. Pl. Glumac.</i> 2 (1855: 296)	<i>Juncus procerus</i> E. Mey., <i>Linnaea</i> 3 (1828: 367)	CHILE. ad ripam fluvii Valdivia	Jan 1852	R.A. Philippi 43 (det. Fr. Buchenau, as <i>Juncus procerus</i> E. M., 3 Dec 1878)	R.A. Philippi, Pl. chilenses, W.R.F. Hohenacker / Herbarium Henschelianum

2) SYNTYPE of *Juncus oxycarpus* E. Mey. ex Kunth (1841: 336) [sine dato, *C.H. Bergius s.n.* (det. Fr. Buchenau 11 Jan 1875 & remark by Buchenau: Bergiussches Exemplar mit der (falschen) Bestimmung v. K. Sprengel); det. by K. Sprengel as *Juncus punctatorius*]. – A syntype at WRS� shown, according to the original publication of Kunth (1841: 337). This is a new syntype (and its only duplicate known) discovered at WRS�.

3) ISOLECTOTYPE of *Juncus capensis* var. *gracilior* Buchenau (1875: 483) [05 Mar 1816, *Bergius s.n.*, det. K. Sprengel (gesamm. von Bergius, det. Fr. Buchenau 11 Jan 1875), current name: *Juncus capensis* Thunb. (1794: 66)]. – Additional specimens were mentioned in the protologue of the new taxon (Buchenau, 1875: 484). Thus, the lectotype was designated (in B, destroyed). Isolectotype (the only duplicate known) was rediscovered at WRS� (the specimen includes collection date (i.e. 5 Mar 1816), which corresponds to the date included in the protologue). The syntype (Bergius specimen at W) does not include a collection date.

The origin of *Juncus* type specimens at WRS� according to country is presented in Fig. 2.

Most of the types and other historically- and nomenclaturally-important specimens come from the following collections: Herb. Henschelianum (30 sheets, i.e. 16.2% of the *Juncus* set at WRS� – see below “A Herbarium/Collection name”), Herb. Schumann (13 sheets, 16.9%), Herb. R. v. Uechtritz (7 sheets, 1.7%), Herb. J. Proćkóŵ (6 sheets), Herb. M. Winkler (3 sheets) and others (19 sheets). Additionally, eight paratypes of *J. bulbosus* f. *submucronatus* Proćkóŵ (2010: 412) are stored in the Herbarium Silesiacum at WRS� (Proćkóŵ 2010) and, thus, are not included in the statistics in this study that covers Herbarium Generale only (as a separate set of two ones at WRS�).

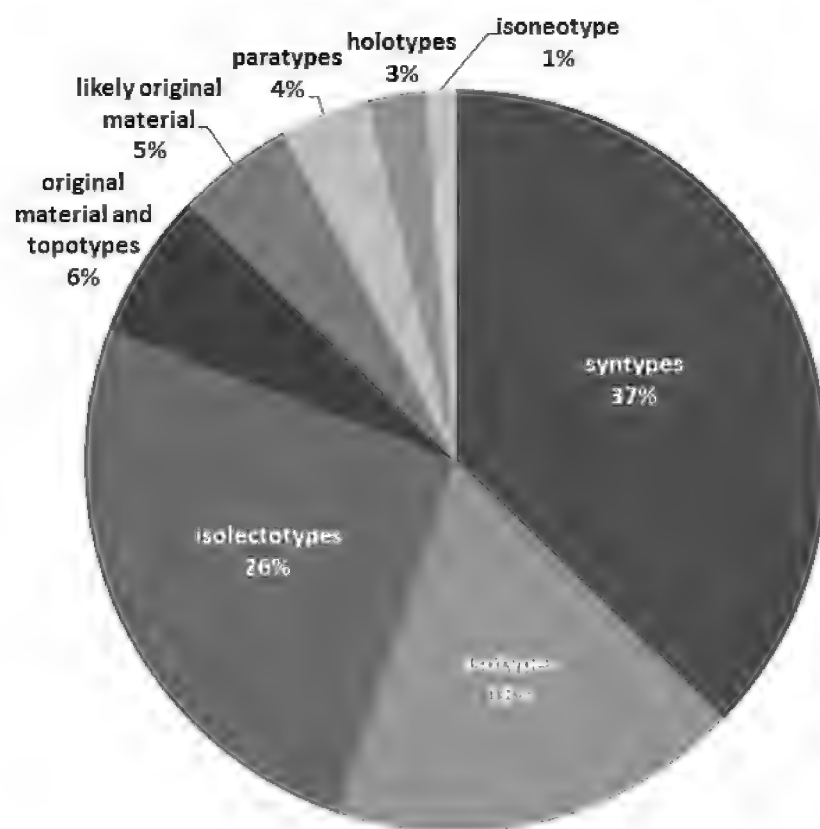


Figure 1. Percentage of different categories of *Juncus* specimens. Types, original material and specimens collected from the original type localities, by the author of the name (“topotypes”) at WRSŁ.

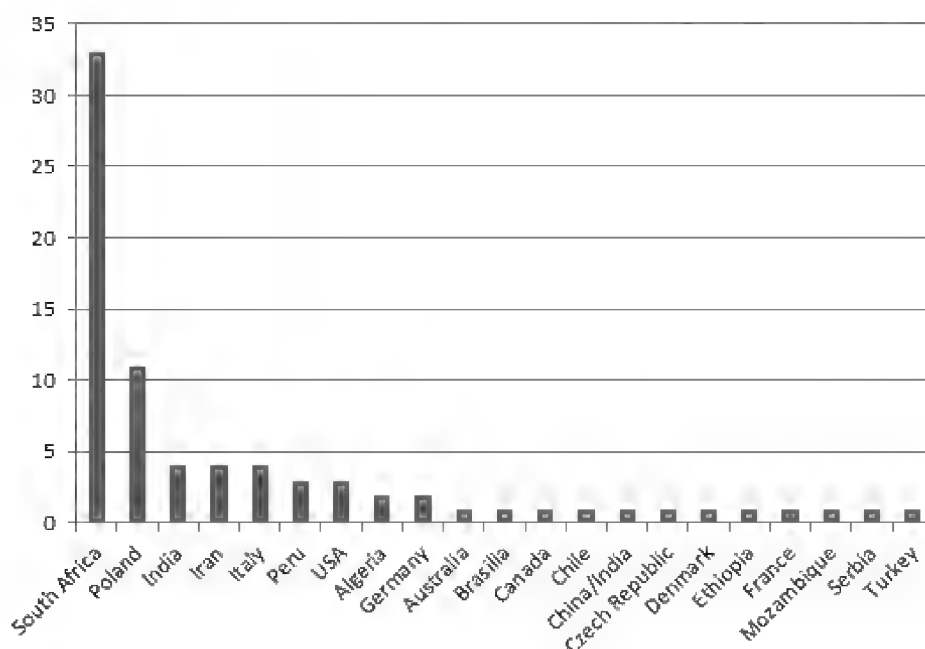


Figure 2. Origin of *Juncus* historically- and nomenclaturally-important specimens at WRS� according to country. Y-axis: number of herbarium sheets. Specimens most frequently originated from South Africa (42.3%). *Juncus* type specimens were collected by many distinguished botanists. Amongst these, the four individuals gathered 37.2% of *Juncus* specimens: C.F. Ecklon & C.L.P. Zeyher, C. Krauss and J.F. Drège.

Species

Approximately 70 *Juncus* species are represented in the collection, most of them from Europe. Species from the rest of the world are less numerous, but still relatively frequent: *J. capensis* Thunb., *J. subulatus* Forssk. (incl. *J. multiflorus* Desf.), *J. nodosus* L., *J. cephalotes* Thunb., *J. dichotomus* Elliott, *J. prismatocarpus* R. Br., *J. acuminatus* Michx., *J. xiphioides* E. Mey., *J. concinnus* D. Don, *J. wallichianus* J. Gay ex Laharpe (incl. *J. monticola* Steud.), *J. pelocarpus* E. Mey., *J. marginatus* Rostk., *J. microcephalus* Humb., Bonpl. & Kunth. and *J. punctorius* L.f., *J. littoralis* C.A. Mey. (as *J. tommasinii* Parl.).

Date of collection

We found 2,193 herbarium labels with dates of collection recorded: 1,967 of these were collected before 1946, comprising ca. 89.7% of the *Juncus* set. The remaining 226 specimens were collected after 1945; 10.3% of the *Juncus* specimens.

Collector and herbarium collection name

In the *Juncus* set at WRS�, the sets of some individuals stand out in numbers of specimens (Fig. 3). The most outstanding collections of *Juncus* from particular included herbaria are (number of herbarium sheets are in parentheses): Herb. R. v. Uechtritz (415), Herb. M. Winkler (394), Herb. Henschelianum (185), Botanischer Tauschverein in Wien (80), Herb. Schumann (77), Herb. Wagnerianum (41), Herb. Dr. C. Baenitz (34), Herb. Emil Fiek (32), Herb. J.A. Allen (24), Reliquiae Mailleanae (24), Herb. F.

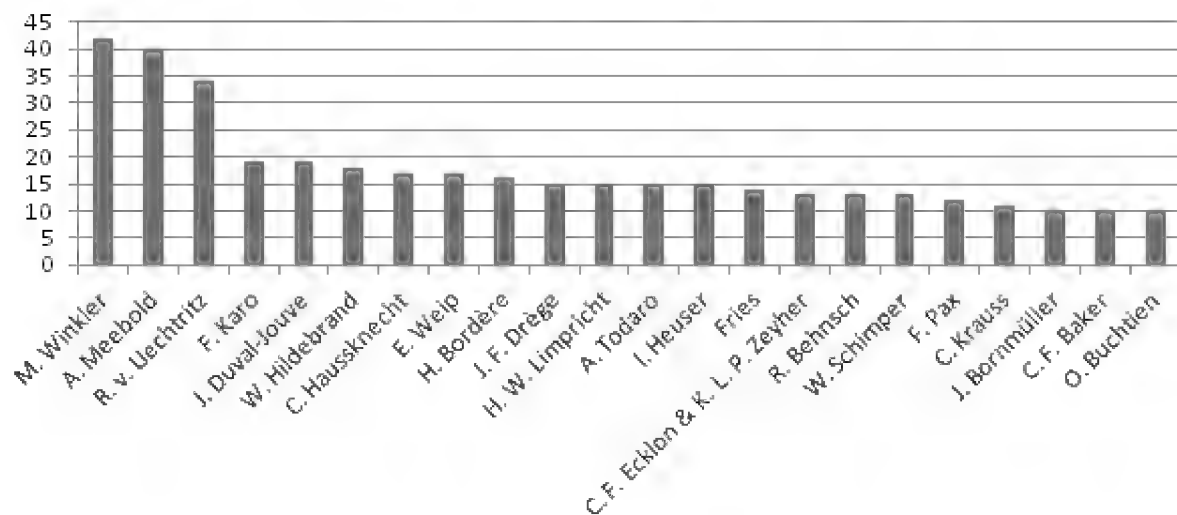


Figure 3. Collectors' names. Y-axis: number of herbarium labels analysed.

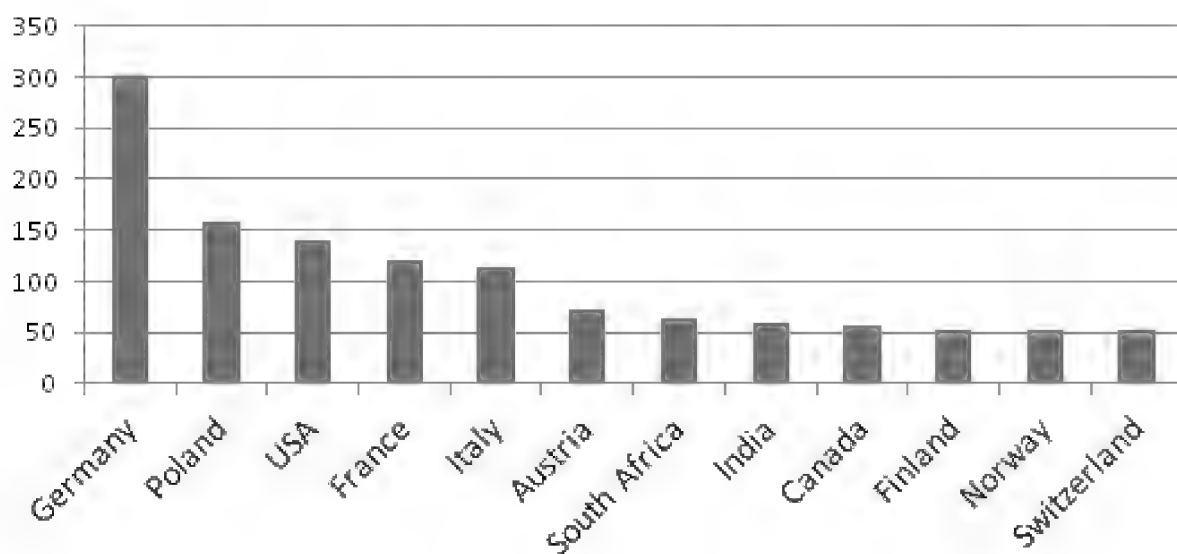


Figure 4. Country representation of *Juncus* specimens in WRSL. Y-axis: number of herbarium labels analysed. The African collection deserves particular attention (98 sheets (4.5%)), including sets from South Africa (64 sheets). The Asian collection (96 sheets) is dominated by plants from India (59). The percentage of plants from North America is as high as 10%.

Pax (21), Herbar P. Louis-Marie (20), Herb. A. Engler (18), Reliquiae Hildebrandianae (18), Herb. Felsmann (15), Herb. J. Duval-Jouve (14), Herb. Schlagintweit from India and High Asia (12), Herb. Hort. Bot. Calcuttensis (11) and Herbar Henri van Heurck (10). Almost half of the *Juncus* sp. sheets come from four individual collections. All were bought for, donated to or exchanged by the Museum. The number of duplicates in the collection is not large (4.6%, i.e. 103 out of 2,222 all taxonomic records).

Country of collection

Herbarium sheets from eastern Poland and Germany (defined according to their post-war borders) dominate and are shown in Fig. 4. For 336 *Juncus* sheets (15.3%), we were unable to establish the country of origin, because no or illegible information on the locality was present on herbarium labels.

Exsiccata series

In the WRS� *Juncus* set, the following exsiccatae are particularly well-represented (the number of herbarium sheets is shown in parentheses): Rchb. Fl. germ. excurs. (incl. Rchb. Fl. Germ. n.) (37), Cyperaceae, Juncaceae, Typhaceae et Sparganiaceae Hungaricae exsiccatae (24), Reise durch das südliche Spanien 1873 (mainly of M. Winkler) (22), Flora of Sikkim (15), Pl. Indiae or[ientalis] (M. Nilagiri), ed. R.F. Hohenacker (13), Todaro Flora Sicula exiccata (11), Flora des NW. Himalaya (10).

Discussion

The Herbarium Generale of the mid-sized WRS� herbarium is rich in specimens relevant to the nomenclature of *Juncus* and contains 78 specimens (3.6% of all *Juncus* specimens examined, see Table 1), with an average of 11 sheets per fascicle (i.e. herbarium box). Seventy-six (of 78) of these historically-important specimens (types, original material and specimens collected at the type locality by the author of the name) were not identified as such before our study. This significant number of types highlights the significance of the analysed set and of WRS� more broadly, for the study of taxonomy and nomenclature (Sutory 1997). To put this into context, the approximate percentages of types stored in other historically-important herbaria are as follows: K (5%), W (3.6%), BM (2.6%) [cited from herbaria websites, which include the total number specimens stored]. Our study revealed that the *Juncus* set at WRS� is a valuable collection globally with respect to the number of historically- and nomenclaturally-relevant specimens. Often, specimens included are associated with research conducted involving a given group of plants in the academic centre housing collections. The majority of *Juncus* specimens (ca. 89.7%) date from before the Second World War and specialists studying the genus *Juncus* did not work at WRS� during that time. This suggests that the rest of the WRS� collection might also contain similarly high percentages of such historically- and nomenclaturally-relevant specimens.

As the genus *Juncus* is rich in species (311 species, Kirschner et al. (2002a, b)), we consider that extrapolation of our results to other genera is appropriate. We assume that descriptions of taxa new to science before 1946 were equally common within most taxonomic groups and specimens belonging to different plant genera/families were sent to the WRS� herbarium equally often.

Only a small fraction of global herbarium specimens had been computerised by the end of last decade (Lughadha and Miller 2009). Despite the recent acceleration of the digitisation of herbarium collections (as of early 2015, the number of scanned specimens within the world's largest virtual herbaria was 18.4 million), we are far from fully digitising all collections (Seregin 2016). Even a small percentage (1–2%) of computerised specimens can drastically reduce research costs and help scientists focus on collections that are likely to contain the most information-rich specimens (O'Connell

et al. 2004). In herbarium management, it is cheaper to produce and distribute scans than facilitate botanist visits (Seregin 2016). Digitisation is also important because young people who do not live near a natural history museum or herbarium can access natural history data and learn to use it and this early involvement in science may cultivate a love for the study of biology (Watanabe 2019). The continued digitisation of the WRS� herbarium (currently only 4.9% digitally available) will certainly reveal new material for botanists' use.

Our results reveal the usefulness of lesser-known herbaria not only from a national or local point of view (Lavoie 2013), but also as a source of important collections and type specimens that are not duplicated in larger facilities (Snow 2005). For *Juncus*, only two of 78 nomenclaturally-relevant specimens identified here were cited by Kirschner et al. (2002a, 2002b), so 76 of the specimens in Table 1 were unknown before this study. Holotypes, isotypes and isolectotypes constitute 46.2% of all types (and other nomenclaturally important specimens) of *Juncus* recognised at the WRS�, highlighting the nomenclature relevance of the collection. Three specimens are particularly worth highlighting here: the holotypes of *Juncus lomatophyllus* Spreng. and *Juncus capensis* var. *gracilior* Buchenau and a syntype of *J. oxycarpus* E. Mey. ex Kunth were originally stored in Berlin (the herbarium of the Botanischer Garten und Botanisches Museum Berlin-Dahlem, Freie Universität Berlin). These were destroyed during the Second World War (Hiepko 1987; Kirschner et al. 2002a) and our discovery of duplicates in WRS� will help with the correct application of these names.

Duplicates of nomenclaturally relevant specimens are often considered to be less important than holotypes, lectotypes and neotypes. Duplicates, however, may differ in physical condition, material quantity, different annotations, labelling, specimen content (plant parts, for example, young fruit vs. only a flowering twig, male vs. female flowers in diclinous plants, with roots vs. without roots) or may even represent mixed gatherings (different taxa). An isotype of *Juncus singularis* Steud. (*J.F. Drège 1604b*) at WRS�, for example, is a much larger, leafy specimen with five inflorescences, as compared with other specimens at G, P, S and W, listed and pictured at plants.jstor.org (accessed on 16 Apr 2020). Annotations by specialists can be very useful in understanding taxonomic concepts: 23 WRS� *Juncus* type specimens were annotated by Franz G.Ph. Buchenau (1831–1906), a *Juncus* specialist whose work remains unsurpassed to this day (annotations included new determinations and/or 'specimen authenticum' indications and were made by him throughout 1874–1875, 1878–1879 and 1887; see the 'Leg. et det.' column in Table 1). Thus, some 'ordinary duplicates' at WRS� are helpful for understanding taxonomists' thinking.

We also found that many of the historically- and nomenclaturally-important *Juncus* specimens stored at WRS� originate from South Africa (42.3%). This overrepresentation might be explained by the origin of the collection. German botanists (together with the British and the Dutch) were a dominant force in the floristic exploration of Africa from the 17th to the early 20th century. The WRS� herbarium is, thus, an important resource for international researchers working on the flora of that hugely biodiverse, but still under-explored, part of the world.

Conclusions

The history of German-Polish herbaria, including WRS�, is very turbulent. A detailed examination of *Juncus*, as a case study, confirms the value of the WRS� collection in historical terms. That a significant number of historically- and nomenclaturally-important specimens at WRS� was acquired passively (*Juncus* was of no special interest to German or Polish scientists at the time) suggests that more such specimens may be found within the collection for other genera. Digitisation and taxonomic revision of material will facilitate the confirmation of the richness of the collection.

Other large type collections contain well-preserved specimens, well-prepared catalogues (often available on-line) and are well-known to scientists. However, the WRS� collection is not only unique, as confirmed here, but not well-known to date.

Some *Juncus* type specimens, listed here, can be found easily in a large number of other collections. However, some are preserved only at WRS� because many types, previously stored in Berlin, were destroyed during the Second World War. Although we researched only a few parts of the WRS� collection, we are convinced that duplicates of many type specimens destroyed in Berlin can be found in Wrocław. Uncatalogued herbaria like WRS� with turbulent histories can be a source of collections important for the study of biodiversity.

We selected *Juncus* as a case study since the collection at WRS� covers the entire distribution range of the genus. Therefore, it likely reflects the general situation in other groups of plants in the herbarium.

Currently, many herbarium sets in Europe are still being catalogued (and many remain undigitised). However, many old collections are indeed valuable and their type and other historical collections have the potential to facilitate taxonomy and nomenclature and, in addition, enhance our knowledge of biodiversity through application of correct names.

Acknowledgements

We would like to thank Krzysztof Świerkosz Ph.D. (curator of WRS�) for making the *Juncus* collections available to us and for providing the latest statistics connected with the WRS� herbarium. We wish to thank Magdalena Mularczyk Ph.D. who consulted with us on matters related to the turbulent history of the herbarium in Wrocław. We also gratefully acknowledge Ewa Lenard Ph.D., who provided the materials connected with an old herbarium of Paolo (Silvio) Boccone. The project is supported by the Leading National Research Centre (KNOW) programme of the Wrocław Center of Biotechnology for years 2014–2018.

References

- Buchenau F (1875) Monographie der Juncaceen vom Cap. Abhandlungen des Naturwissenschaftlichen Vereins zu Bremen 4: 393–512.

- Buchenau F (1890) *Monographia Juncacearum*. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 12: 1–495.
- Buchenau F (1906) Das Pflanzenreich. Regni vegetabilis conspectus. Juncaceae, vol. IV. 36. Wilhelm Engelmann, Leipzig, 284 pp.
- Cope TA, Stace CA (1978) The *Juncus bufonius* L. aggregate in western Europe. Watsonia 12: 113–128.
- Drège JF (1847) Vergleichungen der von Ecklon und Zeyher und von Drège gesammelten südafrikanischen Pflanzen (so weit dieselben noch vorhanden) mit den Exemplaren von Zeyher's neuesten Sammlungen, welche derselbe zum Verkauf stellt durch J. F. Drège in Borstel bei Hambur. Linnaea 20: 183–258.
- Drège JF (1848) Standörter-Verzeichniss der von C. L. Zeyher in Südafrika gesammelten Pflanzen. Linnaea 19: 583–598.
- Goeppert HR (1884) Catalog der Botanischen Museen der Universität Breslau: Nebst e. Xylographie. Heyn, Görlitz, 54 pp.
- Hiepko P (1987) The collections of the Botanical Museum Berlin-Dahlem (B) and their history. Englera 7: 219–252.
- Kirschner J, et al. [Eds] (2002a) Juncaceae 2: *Juncus* subg. *Juncus*, Species Plantarum: Flora of the World (Vol. 7). Australian Biological Resources Study, Canberra, 336 pp.
- Kirschner J, et al. [Eds] (2002b) Juncaceae 3: *Juncus* subg. *Agathryon*, Species Plantarum: Flora of the World (Vol. 8). Australian Biological Resources Study, Canberra, 192 pp.
- Kunth KS (1841) Enumeratio Plantarum Omnium Hucusque Cognitarum, Secundum Familias Naturales Disposita, Adjectis Characteribus, Differentiis et Synonymis (Vol. 3). Stuttgartiae et Tubingae, 644 pp.
- Lavoie C (2013) Biological collections in an ever changing world: Herbaria as tools for biogeographical and environmental studies. Perspectives in Plant Ecology, Evolution and Systematics 15(1): 68–76. <https://doi.org/10.1016/j.ppees.2012.10.002>
- Lughadha EN, Miller C (2009) Accelerating global access to plant diversity information. Trends in Plant Science 14(11): 622–628. <https://doi.org/10.1016/j.tplants.2009.08.014>
- Meyer E (1832) Plantae Ecklonianae. Juncaceae. Linnaea 7: 129–131.
- Mirek Z, Musiał L, Wójcicki JJ (1997) Polish Herbaria. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 116 pp.
- Mularczyk M (1998) Historia Ogrodu Botanicznego Uniwersytetu Wrocławskiego, część 1: 1811–1945. Acta Universitatis Wratislaviensis 2103. Prace Ogrodu Botanicznego Uniwersytetu Wrocławskiego 4: 1–266.
- O'Connell AF, Gilbert AT, Hatfield JS (2004) Contribution of natural history collection data to biodiversity assessment in national parks. Conservation Biology 18: 1254–1261. <https://doi.org/10.1111/j.1523-1739.2004.00034.x-i1>
- Proćków J (2010) *Juncus bulbosus* f. *submucronatus* (Juncaceae), a new taxon from Europe, Australia, Canada, Chile, Azores and Morocco. Annales Botanici Fennici 47(6): 409–424. <https://doi.org/10.5735/085.047.0601>
- Rostański K (1963) Historia Zielnika Instytutu Botanicznego Uniwersytetu Wrocławskiego. Acta Universitatis Wratislaviensis. Prace Botaniczne 14: 283–304.
- Seregin AP (2016) Making the Russian Flora Visible: Fast Digitisation of the Moscow University Herbarium (MW) in 2015. Taxon 65(1): 205–207. <https://doi.org/10.12705/651.29>

- Snow N (2005) Successfully curating smaller herbaria and natural history collections in academic settings. *Bioscience* 55(9): 771–779. [https://doi.org/10.1641/0006-3568\(2005\)055\[0771:SCSHAN\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[0771:SCSHAN]2.0.CO;2)
- Stafleu FA, Cowan RS, Mennega EA (1976) 94 *Regnum vegetabile Taxonomic Literature: A selective guide to botanical publications and collections with dates, commentaries and types*. 1: A-G (2nd ed.). Bohn, Scheltema & Holkema, Utrecht, 1136 pp. <https://doi.org/10.5962/bhl.title.48631>
- Sutory K (1997) Some notes on the quality and economics of a natural history collection. In: Nudds JR, Pettitt CW (Eds) *Value and Valuation of Natural Science Collections: proceedings of the international conference, Manchester, 1995*. Geological Society, London, 22–25.
- Świerkosz K (2017) Herbarium WRSL, Main Collection. <https://doi.org/10.15468/fsybuc>
- Treviranus LC (1831) Über die Verdienste italienischer Botaniker Boccone's und Micheli's um die schlesische Flora. Übersicht der Arbeiten und Veränderungen der Schlesischen Gesellschaft für Vaterländische Kultur: 1–47.
- Wanat M (2013) Muzeum Przyrodnicze Uniwersytetu Wrocławskiego – 200 lat i co dalej? (Część 1). *Opuscula Musealia* 21: 157–168.
- Watanabe ME (2019) The Evolution of Natural History Collections: New research tools move specimens, data to center stage. *Bioscience* 69(3): 163–169. <https://doi.org/10.1093/biosci/biy163>
- Wiktor J (2002) *Museum of Natural History, Wrocław University. History and people: 1814–2000*. Bogucki Wydawnictwo Naukowe, Poznań-Wrocław, 118 pp.